Epidemiology of Sarcopenia in Community-Dwelling Older Adults

by

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(Medical Research)

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Statement of Originality

This thesis contains no material which has been accepted for a degree or diploma by the University or any other institution, except by way of background information and duly acknowledged in the thesis, and to the best of my knowledge and belief no material previously published or written by another person except where due acknowledgement is made in the text of the thesis, nor does the thesis contain any material that infringes copyright.

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Chapter 7:

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Statement of Ethical Conduct

The research associated with this thesis abides by the international and Australian codes on human and animal experimentation, the guidelines by the Australian Government‘s Office of the Gene Technology Regulator and the rulings of the Safety, Ethics and Institutional Biosafety Committees of the University.

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Abstract

Background

Older adult functional declines may be partly attributable to sarcopenia (the age-related loss of skeletal muscle mass and function), and also age-related fat gains. The associations of lifestyle factors with skeletal muscle and body fat changes are unclear.

Aim

To investigate how measures of ambulatory activity, dietary nutrient intake, vitamin D, chronic disease and medication use, associate with changes in muscle mass, lower-limb function, falls risk and body fat in community-dwelling older adults.

Materials and Methods

Total N = 875 adults aged 50 - 80 years (51% female; mean age = 62 ± 7 years) participated at baseline and 2.6 ± 0.4 years later. Appendicular lean mass (ALM), leg lean mass, and body fat were assessed by Dual-energy X-ray Absorptiometry (DXA). Lower-limb muscle function was assessed by dynamometry, and leg and whole body muscle quality (LMQ and WBMQ) was calculated. Falls risk score was assessed by a Physiological Profile Assessment (PPA). Study factors including ambulatory activity (AA) measured by pedometer, 25-hydroxyvitamin D (25OHD) by radioimmunoassay, radiographic osteoarthritis (ROA) by X-ray, and dietary nutrient intake, pain, and statin medication use reported by questionnaire, were assessed.

Results

Total body and trunk fat mass were negatively associated with seasonally-adjusted pedometer-determined AA in both men and women in cross-sectional analyses, but men only

in prospective analyses. In women only, significant positive associations for leg strength and LMQ, and also WBMQ, with AA were observed. Energy-adjusted protein, iron, magnesium, phosphorus, and zinc intakes were significant positive predictors of change in ALM, while retinol was a negative predictor of change in ALM. Nutrient intakes did not predict changes in knee extension strength. 25OHD positively predicted change in leg strength and LMQ, and change in 25OHD was also predicted by baseline percentage ALM (%ALM), leg strength, LMQ and AA, after adjustment for sun exposure and body fat. Knee and hip pain measures predicted deleterious changes in muscle function and falls risk in women only; no muscle function associations were observed for ROA in either sex. Over time, statin users demonstrated decreased leg strength and LMQ, and increased falls risk, compared to non-users.

Conclusions

This series of related analyses of a prospective population-based study of community-dwelling older adults provides considerable insight into the epidemiology of sarcopenia. Interventions focused on maintaining or improving behaviours including physical activity, diet, and sun exposure, as well as more effective management of chronic disease, may be efficacious in the prevention of skeletal muscle mass loss, functional decline, and obesity.

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Publications Arising from the Thesis

Chapter 4: Scott D, Blizzard L, Fell J, & Jones G. Ambulatory activity, body composition and lower-limb muscle strength in older adults. *Medicine and Science in Sports and Exercise* (2009) 41: 383-9.

Chapter 5: Scott D, Blizzard L, Fell J, & Jones G. Prospective associations between ambulatory activity, body composition and muscle function in older adults. *Scandinavian Journal of Medicine and Science in Sports* (available on-line 28/08/2010) DOI: 10.1111/j.1600-0838.2010.01229.x.

Chapter 6: Scott D, Blizzard L, Fell J, Giles G, & Jones G. Associations between dietary nutrient intake, muscle mass and strength in community-dwelling older adults: The Tasmanian Older Adult Cohort Study. *Journal of the American Geriatrics Society* (accepted for publication 02/07/2010).

Chapter 7: Scott D, Blizzard L, Fell J, Ding C, Winzenberg T, & Jones G. A prospective study of the associations between 25-hydroxyvitamin D, sarcopenia progression, and physical activity in older adults. *Clinical Endocrinology* (2010) 73: 581-7.

Chapter 8: Scott D, Blizzard L, Fell J, & Jones G. A prospective study of the associations between self-reported pain, radiographic osteoarthritis and sarcopenia in community-dwelling older adults. *Pain* (manuscript under preparation).

Chapter 9: Scott D, Blizzard L, Fell J, & Jones G. Statin therapy, muscle function and falls risk in community-dwelling older adults. *Quarterly Journal of Medicine* (2009) 102: 625-33.

Scientific Presentations Arising from the Thesis

2009 19th International Association of Gerontology and Geriatrics World Congress (Paris, France).

–Ambulatory activity, nutrient intake and statin use as determinants of sarcopenia in community-dwelling older adults" (Oral presentation).

2009 8th National Emerging Researchers in Ageing Conference (Melbourne, Australia).

–The Recommended Dietary Intake (RDI) for protein and indicators of sarcopenia in community-dwelling older adults" (Poster presentation).

2008 3rd Australian Association for Exercise and Sport Science Conference (Melbourne, Australia).

–Cross-sectional associations between leg strength, body composition and pedometer-determined ambulatory activity in older adults" (Oral presentation).

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